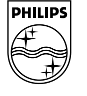
DATA SHEET

TDA2653A
Vertical deflection circuit

Product specification
File under Integrated Circuits, IC02

January 1991

Philips
Semiconductors





DESCRIPTION

The TDA2653A is a monolithic integrated circuit for vertical deflection in large screen colour television receivers.

The circuit incorporates the following functions:

- Oscillator; switch capability for 50 Hz/60 Hz operation
- Synchronization circuit
- Blanking pulse generator with guard circuit
- Sawtooth generator with buffer stage
- Preamplifier with fed-out inputs
- Output stage with thermal and short-circuit protection
- Flyback generator
- Voltage stabilizers

QUICK REFERENCE DATA

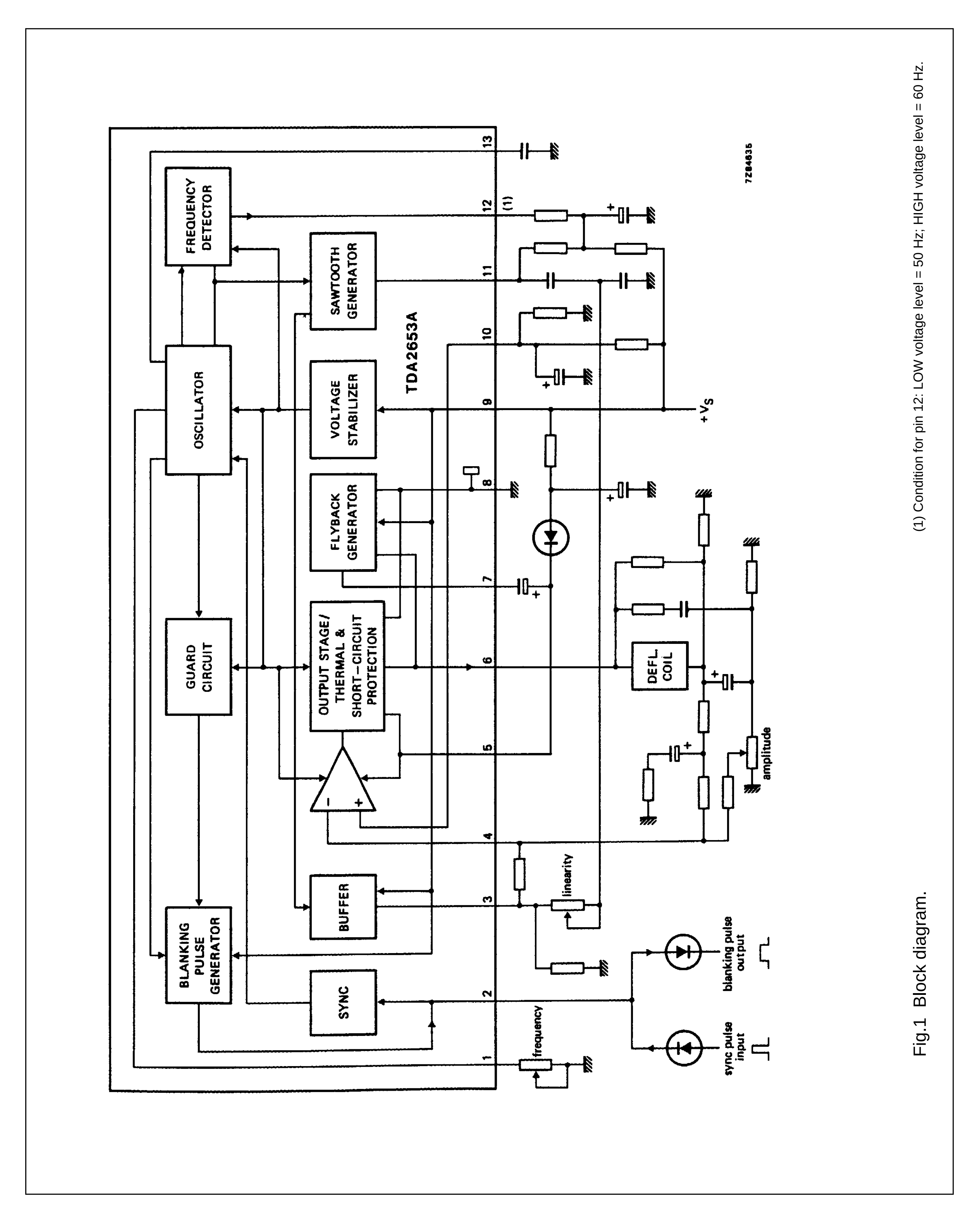
Supply voltage (pin 9)	$V_{9-8} = V_S$	typ.	26 V
Supply current (pin 5 + pin 9) (1)	$I_5 + I_9 = I_S$	typ.	325 mA
Output current (peak-to-peak value) (1)	$I_{6(p-p)}$	typ.	1,7 A
Maximum output current (peak-to-peak value)	$I_{6(p-p)}$	max.	2,6 A
Picture frequency	f		50 Hz/60 Hz
Sync input pulse (peak-to-peak value)	$V_{2-8(p-p)}$	≥	1 V
Thermal resistance from junction to mounting base	$R_{th\ j-mb}$	≤	5 K/W

Note

1. for 45 AX systems

PACKAGE OUTLINE

13-lead SIL; plastic power (SOT141RGA); SOT141-6; 1996 November 19.



(1) Condition for pin 12: LOW voltage level = 50 Hz; HIGH voltage level = 60 Hz.

Fig.1 Block diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage (pin 9)	$V_{9-8} = V_S$	max.	40	V
Supply voltage output stage (pin 5)	$V_{5\text{-}8}$	max.	60	V
Voltages				
Pin 3	V_{3-11}	max.	7	V
Pin 13	$V_{13\text{-}8}$	max.	7	V
Pins 4 and 10	$V_{4;\,10\text{-}8}$	max.	24	V
Pin 6	$v_{6\text{-}8}$	max.	60	V
	$-V_{6-8}$	max.	0	V
Pins 7 and 11	$V_{7;\,11-8}$	max.	40	V
Currents				
Pin 1	I_1	max.	0	mA
	$-I_1$	max.	1	mA
Pin 2	$\pm I_2$	max.	10	mA
Pin 3	I_3	max.	0	mA
	$-I_3$	max.	5	mA
Pin 7	I_7	max.	1,3	A
	$-I_7$	max.	1,5	A
Pin 11	I_{11}	max.	50	mA
	$-I_{11}$	max.	1	mA
Pin 12	I_{12}	max.	3	mA
	$-I_{12}$	max.	0	mA

Pins 5, 6 and 8: internally limited by the short-circuit protection circuit.

Total power dissipation: internally limited by the thermal protection circuit.

Storage temperature range	T_{stg}	–25 to + 150 °C
Operating ambient temperature range	T_{amb}	0 °C to limiting value

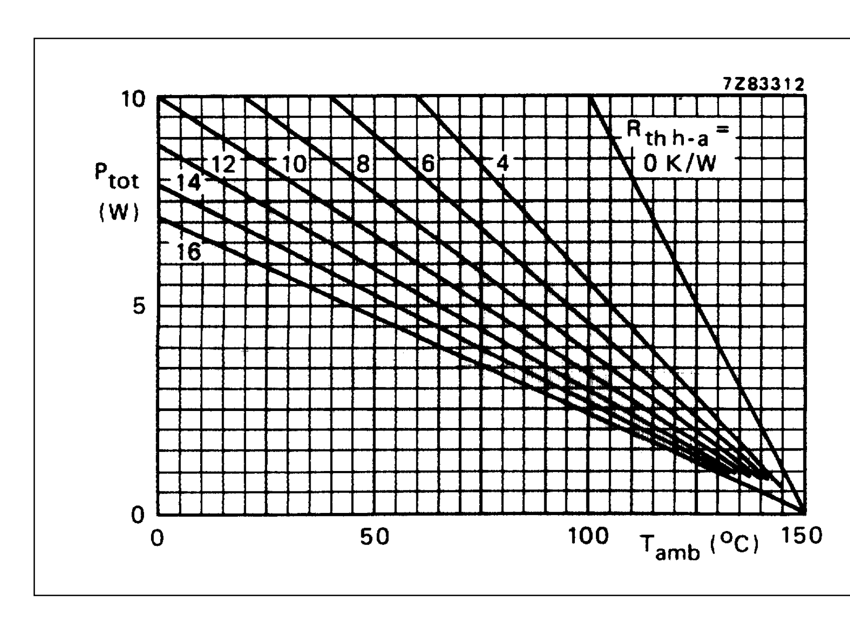


Fig.2 Total power dissipation.
$R_{th\ h\text{-}a}$ includes $R_{th\ mb\text{-}h}$ which is expected when heat-sink compound is used.
$R_{th\ j-mb} \leq 5$ K/W.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

Supply voltage/output stage				
Supply voltage	$V_{9-8} = V_S$		9 to 30	V
Output voltage				
at $-I_6$ = 1,1 A	V_{6-8}	≥	V_{5-8} – 2,2	V
		typ.	V_{5-8} – 1,9	V
at I_6 = 1,1 A	V_{6-8}	typ.	1,3	V
		≤	1,6	V
Flyback generator output voltage at $-I_7$ = 1,1 A	V_{7-8}	typ.	V_S – 2,2	V
Peak output current	$\pm I_6$	≤	1,3	A
Flyback generator peak current	$\pm I_7$	≤	1,3	A
Feedback				
Input quiescent current	$-I_{4;\,10}$	typ.	0,1	μA
Synchronization				
Sync input pulse	V_{2-8}		1 to 12	V
Tracking range		typ.	28	%
Oscillator/sawtooth generator				
Oscillator frequency control input voltage	V_{1-8}		6 to 9	V
Sawtooth generator output voltage	V_{3-8}		0 to V_S – 1	V
	V_{11-8}		0 to V_S – 2	V
Sawtooth generator output current	$-I_3$		0 to 4	mA
	I_{11}	≥	–2	μA
		≤	+30	mA
Oscillator temperature dependency				
T_{case} = 20 to 100 °C	$(\Delta f/f)/\Delta T_{case}$	typ.	10^{-4}	K^{-1}
Oscillator voltage dependency				
V_S = 10 to 30 V	$(\Delta f/f)/\Delta V_S$	typ.	4 x 10^{-4}	V^{-1}
Blanking pulse generator				
Output voltage				
at V_S = 24 V; I_2 = 1 mA	$V_{2–8}$	typ.	18,5	V
Output current	$-I_2$	≤	3	mA
Output resistance	$R_{2–8}$	typ.	410	Ω
Blanking pulse duration at 50 Hz sync	t_b	typ.	1,4 ± 0,07	ms
50 Hz/60 Hz switch capability				
Saturation voltage; LOW voltage level	$V_{12–8}$	typ.	1	V
Output leakage current	I_{12}	typ.	1	μA
Thermal resistance/junction temperature				
From junction to mounting base	$R_{th\ j-mb}$	≤	5	K/W
Junction temperature; switching point thermal protection	T_j	typ.	150 ± 8	°C

PINNING

1. Oscillator adjustment
2. Synchronization input/blanking output
3. Sawtooth generator output
4. Preamplifier input
5. Positive supply of output stage
6. Output
7. Flyback generator output
8. Ground
9. Positive supply (V_S)
10. Reference voltage
11. Sawtooth capacitor
12. 50 Hz/ 60 Hz switching voltage
13. Oscillator capacitor

APPLICATION INFORMATION

The function is described against the corresponding pin number

1, 13. Oscillator

The oscillator frequency is determined by a potentiometer at pin 1 and a capacitor at pin 13.

2. Sync input/blanking output

Combination of sync input and blanking output. The oscillator has to be synchronized by a positive-going pulse between 1 and 12 V. The integrated frequency detector delivers a switching level at pin 12.
The blanking pulse amplitude is 20 V with a load of 1 mA.

3. Sawtooth generator output

The sawtooth signal is fed via a buffer stage to pin 3. It delivers the signal which is used for linearity control, and drive of the preamplifier. The sawtooth is applied via a shaping network to pin 11 (linearity) and via a resistor to pin 4 (preamplifier).

4. Preamplifier input

The DC voltage is proportional to the output voltage (DC feedback). The AC voltage is proportional to the sum of the buffered sawtooth voltage at pin 3 and the voltage, with opposite polarity, at the feedback resistor (AC feedback).

5. Positive supply of output stage

This supply is obtained from the flyback generator. An electrolytic capacitor between pins 7 and 5, and a diode between pins 5 and 9 have to be connected for proper operation of the flyback generator.

6. Output of class-B power stage

The vertical deflection coil is connected to this pin, via a series connection of a coupling capacitor and a feedback resistor, to ground.

7. Flyback generator output

An electrolytic capacitor has to be connected between pins 7 and 5 to complete the flyback generator.

8. Negative supply (ground)

Negative supply of output stage and small signal part.

9. Positive supply

The supply voltage at this pin is used to supply the flyback generator, voltage stabilizer, blanking pulse generator and buffer stage.

10. Reference voltage of preamplifier

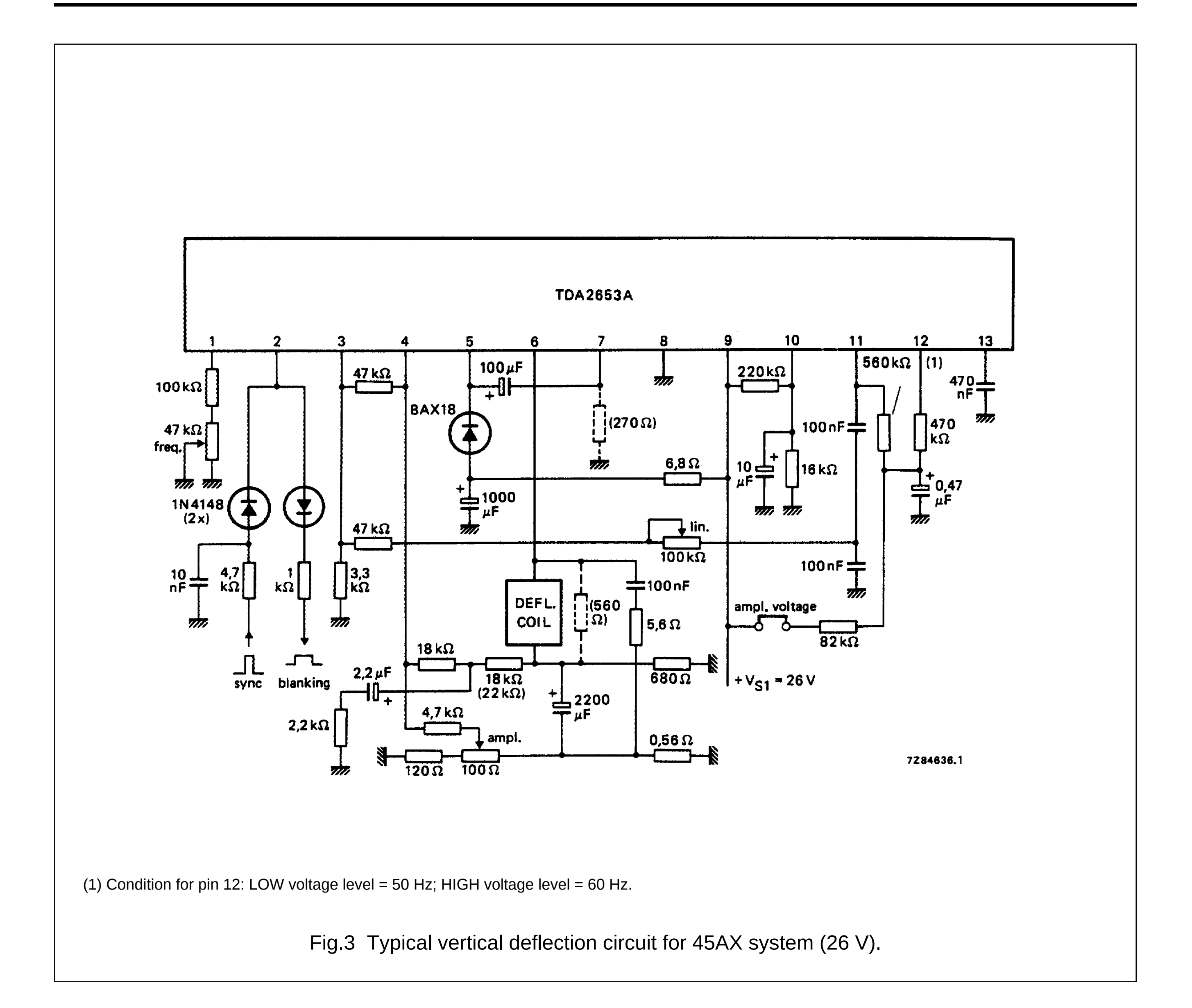
External adjustment and decoupling of reference voltage of the preamplifier.

11. Sawtooth capacitor

This sawtooth capacitor has been split to realize linearity control.

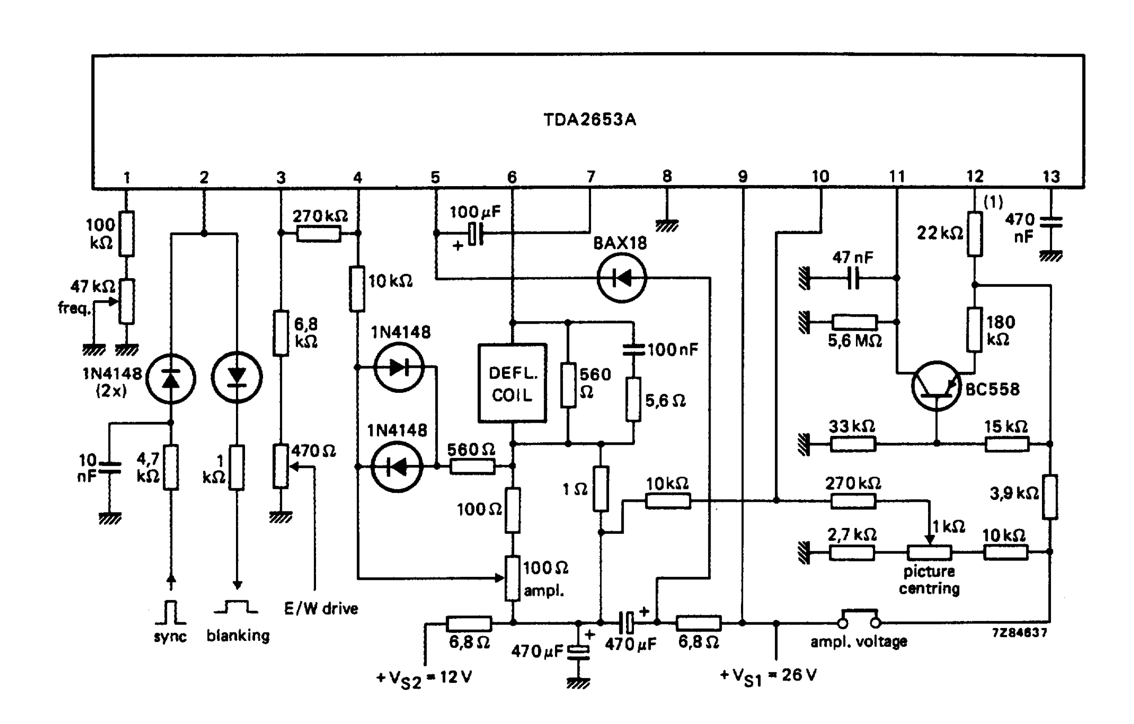
12. 50 Hz/60 Hz switching level

This pin delivers a LOW voltage level for 50 Hz and a HIGH voltage level for 60 Hz. The amplitudes of the sawtooth signals can be made equal for 50 Hz and 60 Hz with these levels.



(1) Condition for pin 12: LOW voltage level = 50 Hz; HIGH voltage level = 60 Hz.

Fig.3 Typical vertical deflection circuit for 45AX system (26 V).

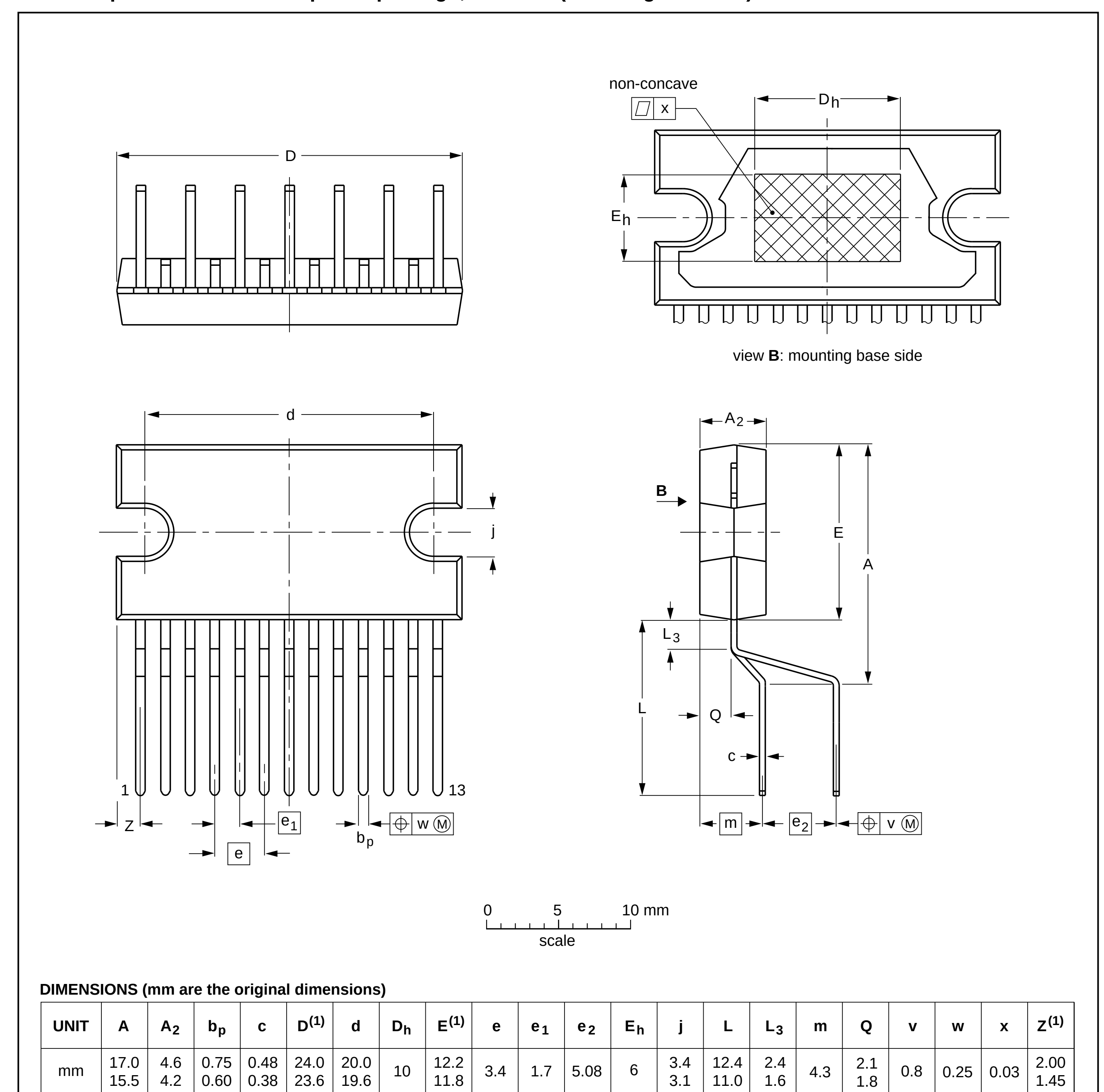


(1) Condition for pin 12: LOW voltage level = 50 Hz; HIGH voltage level = 60 Hz.

Fig.4 Typical vertical deflection circuit for 45 AX system (V_{S1} = 26 V, V_{S2} = 12 V) in quasi-bridge connection.

PACKAGE OUTLINE

DBS13P: plastic DIL-bent-SIL power package; 13 leads (lead length 12 mm) SOT141-6



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_2	b_p	c	$D^{(1)}$	d	D_h	$E^{(1)}$	e	e_1	e_2	E_h	j	L	L_3	m	Q	v	w	x	$Z^{(1)}$
mm	17.0 15.5	4.6 4.2	0.75 0.60	0.48 0.38	24.0 23.6	20.0 19.6	10	12.2 11.8	3.4	1.7	5.08	6	3.4 3.1	12.4 11.0	2.4 1.6	4.3	2.1 1.8	0.8	0.25	0.03	2.00 1.45

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT141-6						~~92-11-17~~ 95-03-11

SOLDERING

Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our *“IC Package Databook”* (order code 9398 652 90011).

Soldering by dipping or by wave

The maximum permissible temperature of the solder is 260 °C; solder at this temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified maximum storage temperature ($T_{stg\ max}$). If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

Repairing soldered joints

Apply a low voltage soldering iron (less than 24 V) to the lead(s) of the package, below the seating plane or not more than 2 mm above it. If the temperature of the soldering iron bit is less than 300 °C it may remain in contact for up to 10 seconds. If the bit temperature is between 300 and 400 °C, contact may be up to 5 seconds.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.